

United States Patent [19]

d'Alayer de Costemore d'Arc

[11] **Patent Number:** **6,065,694**
 [45] **Date of Patent:** **May 23, 2000**

[54] **FLOW LIMITER**

5,884,667 3/1999 North 138/46

[75] Inventor: **Stephane M. A. d'Alayer de Costemore d'Arc**, Genappe, Belgium

FOREIGN PATENT DOCUMENTS

1186758 9/1959 France .
 1263430 3/1968 Germany .
 4310738 10/1994 Germany .

[73] Assignee: **Staar S.A.**, Brussels, Belgium

[21] Appl. No.: **09/182,894**

Primary Examiner—Patrick Brinson
Assistant Examiner—Davis Hwu
Attorney, Agent, or Firm—Leydig, Voit & Mayer

[22] Filed: **Oct. 30, 1998**

Related U.S. Application Data

[63] Continuation-in-part of application No. 09/048,584, Mar. 27, 1998.

[30] Foreign Application Priority Data

Apr. 2, 1997 [BE] Belgium 97 00302
 Jun. 11, 1997 [BE] Belgium 97 00504

[51] **Int. Cl.⁷** **B05B 1/30**

[52] **U.S. Cl.** **239/586; 239/574**

[58] **Field of Search** 239/586, 574,
 239/70; 138/46; 251/208

[56] References Cited

U.S. PATENT DOCUMENTS

1,484,290 2/1924 Birtch 239/574
 2,793,075 5/1957 Gulick, Jr. 239/574
 3,341,168 9/1967 Toepfen 251/208
 4,214,607 7/1980 Bouteille 137/499
 4,290,152 9/1981 Kesselman, Sr. 4/191
 4,606,370 8/1986 Geipel et al. 137/119
 4,718,128 1/1988 Fan 4/192
 4,723,567 2/1988 Phlipot et al. 251/208
 4,804,164 2/1989 Nakazawa et al. 138/46
 4,838,485 6/1989 Rinkewich 239/70
 5,054,521 10/1991 Hendrick 251/208
 5,092,560 3/1992 Chen 251/129.11
 5,249,773 10/1993 Feld 251/129.11
 5,360,172 11/1994 Wang 239/586
 5,361,804 11/1994 Keller et al. 137/801
 5,501,400 3/1996 Kuo 239/574
 5,653,260 8/1997 Huber 137/625.33
 5,730,819 3/1998 Retti 156/71

[57] ABSTRACT

A flow limiter device for liquid delivery systems including a pipe having a liquid inlet and a liquid outlet, two adjacent chambers within the pipe through which liquid flows between the inlet and outlet, one chamber being smaller than the other chamber, a valve member movably mounted in the pipe for movement between a flow-limiting position and a full-flow position, and an internal control element which, when actuated from outside the device, causes the valve member to shift from the flow-limiting to the full-flow position. At the flow-limiting position, the valve member limits flow through the smaller chamber to a predetermined limited-flow rate; pressure exerted on the valve member due to liquid flow through the device is effective to move the valve member to the full-flow position when liquid is admitted through the inlet and the control element is actuated; an abutment carried by the control element has a first position where it determines the location of the valve member relative to the smaller chamber and sets flow-rate at the flow-limiting position, and a second position to which it is moved when the control element is actuated and where, when moved by liquid pressure, the valve member operatively clears the abutment and moves to the full-flow position. Flow is sequential through the chambers in both the flow-limiting and full-flow positions of the valve member. Alternative constructions are shown for operating the internal control element from outside the device including a manual handle, a power actuator, and alternative outside-inside connections including a mechanical through-wall coupling and a magnetic coupling.

43 Claims, 4 Drawing Sheets

